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Presidential Address

Delivered at Lincoln on 14th March, 1970
by
Dr. P. E. KENT, D.Sc., Ph.D., F.R.S., F.G.S.

LINCOLNSHIRE GEOLOGY IN ITS REGIONAL SETTING

The theme of this Address is the manner in which detailed information collected from the face of Lincolnshire year by year and decade by decade, fits into and supplements the regional geological picture of Eastern England and the adjoining areas.

Lincolnshire as a county has a subdued topography; it is agriculturally rich and there is an almost total absence of waste land. It follows that there is, in consequence, severe limitation of exposures of the solid rocks which floor the county, and although limited areas (mainly in the north) are extensively quarried for economic minerals we are dependent on temporary exposures (pipe trenches, foundations and stream widening) for the greater part of the new data with which we can map and interpret the geology of the greater part of the county.

Temporary exposures present problems — machine excavation mixes debris from different beds; over-rapid operation may allow very little time for examination, or for the cleaning action of the weather. In recent years pylon foundations have provided repeated opportunities for spot-sampling some of the outcrops, and major gas-line trenches have provided continuous sections of great value. For collection of index fossils, however, deepening of stream sections may be most useful where these cut into the solid formation, as sections tend to be clean, continuous and sufficiently weathered for removal of the smears of the excavation operation.

Boreholes have, of course, made a major contribution to the understanding of the rocks of Lincolnshire and their concealed continuation down dip towards the east. But their interpretation is largely based on the detailed (if localised) information from outcrop exposures. It is the surface aspect which I wish to stress in the following pages — particularly the significance of recent discoveries and some of the problems still awaiting solution.

Lincolnshire Stratigraphy

The Rhaetic Beds

As in the Midlands, the Rhaetic shows two subdivisions; Black Shales below and Cotham Beds above. Overall, the thickness variation in the County established the presence of a well marked basin, linked to the Midlands and Yorkshire developments by thinner belts, which has proved to be a pattern for other areas. And just as in Lincolnshire, the thickening in the other basins (Staffordshire and Cheshire) has been found to be accompanied by the incoming of such distinctive beds as the *Pecten* (*Chlamys*) *valoniensis* limestone, previously known in southern England (Kent, 1953, 1968).

The brown or reddish facies of the Upper Rhaetic was believed to be special to the county when it was discovered in shallow boreholes and at outcrops near Alkborough. It has since been found to continue at depth not only into East Yorkshire but also in the North Sea, where knowledge of this Lincolnshire variant from the classical sequence has helped interpretation and the dating of the beds.

Exposures of the upper part of the succession are rare in Lincolnshire, but a shallow claypit lately opened at Kettlethorpe (Grid SK 852,763) has shown the Lias-Rhaetic junction on the edge of the thicker Rhaetic development. At the junction, two feet below the shelly *Ostrea* limestones of the basal Lias, big flattened nodules of smooth-fracturing pale weathering yielded in 1968 an assemblage of bivalves characteristic of the White Lias (Langport Beds). This is a Rhaetic subdivision demonstration of the northerly thinning of the formation. When first opened the writer observed in this section lenses of massed belemnites in a glauconitic sandstone at the junction, indicative of a phase of erosion with the fossils concentrated when the containing clays were washed away.

Northampton Ironstone and Dogger

Throughout England the junction between the Lias and the Inferior Oolite is marked by sands, ironstones and by interruptions in continuity of deposition, providing a series which is very variable and also difficult to date.

The Northampton Ironstone of the Midlands extends as a workable ore into South Lincolnshire; it thins rather irregularly northwards and was formerly worked at Lincoln (Greetwell), dying out a few miles north of there. This bed was for long ascribed to the Inferior Oolite, but was found in Northamptonshire to be of Upper Lias date, and Upper Lias ammonities were found in the basal beds at Colsterworth (Richardson, 1931).

The dating has been supplemented by an ammonite from the higher beds, found by the writer at Hungerton Quarry near Grantham in 1966 at the top of the 'Main Oolite' horizon, about three feet below the Lower Estuarine contact, identified by Dr. R. V. Melville of the Geological Survey as *Lioceras* cf. *opalinum* (I.G.S. registered number ZN 9530). This specimen indicates that most, if not all, the Ironstone in this area belongs to the Upper Lias (*opalinum* zone).

In contrast to this, discovery of a Dogger fauna of Yorkshire species near Wressell, Brigg, was recorded in these Transactions in 1968. The fossils were found in a four-foot thick development of rich ironstone, surviving in an area where the Estuarine Beds are usually in direct contact with the earlier part of the Upper Lias; they show that the Dogger Ironstone originally extended southwards for some miles beyond the Humber.

We thus have a Liassic ironstone (the Northampton Ironstone) extending from the Midlands through southern and mid Lincolnshire, but relics of an Inferior Oolite Ironstone extending from Yorkshire into North Lincolnshire. Our area, in fact, was a shelf area of shallow water beds, which were deposited and sometimes eroded away before deposition continued.

Lower Estuarine

Above the Northampton Ironstone the Lower Estuarine Beds provide a different set of problems. They have often been stated to lack marine fossils, but following up an isolated discovery made as a student in the 1930's your President has been recently involved in a study of a marine bed in the Lower Estuarine in the ironstone mines of the Lincolnshire/Leicester border. The original discovery was made at Sproxton; a marine shale in the middle part of the series now proves to extend eastwards to Stainby and Colsterworth and northwards to Hungerton (the present limit of large exposures). The fauna is mainly of bivalves — a single small gastropod only has been found — which are mostly very small, so that the marine element has been overlooked by others. The predominant form which has usually been named *Corbula* (not necessarily fully marine) occurs in very large numbers, covering bedding planes.

Transactions of the Lincolnshire Naturalists' Union
Vol. XVII No. 3 Part 1 1970

This page replaces the first paragraph at the top of page 136.

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The Lower Lias

The Lower Lias consists predominantly of clays, and although in the last century local village brickworks provided sections along the outcrop, we are now almost entirely dependent on incidental exposures. Part of the newer information on the limestones, sandstones and ironstones which diversify the clay sequence was summarised in "The Geology of Lincolnshire", but this can now be extensively supplemented from shallow exposures.

In 1964 a regional gas line trench was cut nearly northwards along the Lias outcrop from near Norton Disney past Swinderby and Eagle to Harby, and in this stretch crossed and recrossed the group of limestones and shales in the upper *angulata* zone corresponding to the Granby Limestones of the Vale of Belvoir, not previously known in mid Lincolnshire but now seen to produce the low rises on which the villages are located. Overall the limestones are soft and argillaceous; at the top is a horizon of crinoidal limestone (or limestones) which near Swinethorpe is largely made up of well preserved *Schlotheimia* with fewer *Metophioceras* cf. *conybeari* — evidently on the *angulata/bucklandi* boundary. The conical tracefossil *Kulindrichnus* (Doughty 1965a) is a marker the length of Lincolnshire in the middle part of this limestone group.

Further south pylon foundations have made a contribution to understanding of the complex fault belt near Allington and Sedgbrook, and at Grid SK 886,384.6 exposed shales with the zonal ammonite *Caenesites turneri*, an index form hitherto missing in Lincolnshire.

One of the problems special to Lincolnshire is the reason for the development of the Frodingham Ironstone, the conditions of its deposition and its uniqueness in the succession. We now know that iron-precipitating activity was not confined to that specific horizon, but that the underlying argillaceous limestones in North Lincolnshire often contain abundant iron grains (limonite ooliths). The clearest information has come from shallow boreholes, but the limonite-bearing limestones have been available for inspection — and apparently unnoticed — in local churchyard walls for centuries.

[P.T.O.

The development of sandstone beds in the Lias clays was documented in some detail in the "Geology of Lincolnshire"; newer exposures (pylon foundations and streams) have emphasised the importance of the sandy beds in the *raricostatum* zone southwest and northwest of Lincoln, with multiple calcareous sandstones separated by sandy clays and silts, associated with very shallow-water molluscan faunas — possibly inter-tidal deposits. The strong development of this shallow-water facies in mid-western Lincolnshire indicates the possibility of a shoreline at no great distance during this interval.

Faunally, one of the richest localities was found on the River Till around 1940 by Mr. Gelder, then Stow tinsmith. Deepening of the river into the clays and thin limestones of the *raricostatum* zone yielded numerous beautifully preserved small ammonites, unique for the region and providing new evidence of the continuity of the faunas across England. The corresponding beds are absent at Scunthorpe, where higher beds of the Lias rest on the Frodingham Ironstone, but they should be present in southwest Lincolnshire and still await discovery. Slightly higher beds of the zone with abundant ammonites including *Leptechioceras* were exposed temporarily in 1968 at the Grantham sewage works, Marston (Grid SK 906,427). The *jamesoni* zone, above is now known in Lincolnshire from Cleatham Barrows in the north (Doughty 1965b) as well as in the Grantham district.

A new clay pit at Mount Pleasant near Kirton in Lindsey has exposed the junction of the Middle and Lower Lias, with only 18 feet of the *margaritatus* zone surviving (Howarth and Rawson 1965), a further demonstration of the northerly thinning of the formation. When first opened the writer observed in this section lenses of massed belemnites in a glauconitic sandstone at the junction, indicative of a phase of erosion with the fossils concentrated when the containing clays were washed away.

In the same shale group *Aviculopecten* is common at Colsterworth, rarer elsewhere; *Protocardium* is widespread; *Trigonia* is usually rare but has been found at Hungerton, Sproxton, Colsterworth and is locally abundant at Stainby; fairly large *Pholadomya* occurs at Stainby and Hungerton; small *Modiolus* has been found at Stainby. The Trigoniae resemble the assemblage of the Northampton Ironstone and Variable Beds rather than those of the overlying Lincolnshire Limestone. Although the shells are mainly dis-articulated and drifted this assembly demonstrates that a tongue of marine waters extended for a short time from the South Midlands as far as the Grantham district, interrupting the regime of deltaic and estuarine non-marine sands and clays which preceded the deposition of the Lincolnshire Limestone. Further work is in progress on the fauna and its variations.

The Lincolnshire Limestone

The hundred foot thick bed which forms "The Cliff" and extends from the Humber into Northamptonshire is the largest body of rock in the British Inferior Oolite, but the problems of correlation are still only partly solved (Kent, 1967; Sylvester-Bradley, 1968). Nearly all the recorded ammonities have been found by members of this Union (F. T. Baker, R. J. Batters, A. E. Musgrave and the writer); they have established that the lower beds, at least, belong to the *sowerbyi* zone. Quite recently a *Hyperlioceras* has been found by Birmingham students a short distance beneath the Upper Estuarine Beds at Clipsham; this however proves to originate in beds older than the Clipsham Stone, and the old record of "an ammonite resembling *A. humphriesianus*" from Appleby, suggesting beds equivalent to the Scarborough limestone, remains unique and unconfirmed for the Upper Lincolnshire Limestone.

New surface excavations continue to supplement our knowledge of lithology, particularly in the areas which lack quarries. A major gas-line trench has provided the first complete Lincolnshire Limestone sections near Spital, and has shown the progressive northerly incoming of the wedge of the 'Hydraulic Limestone' which becomes a major rock-bed in Yorkshire, as well as the development of rich *Terebratula* beds with a number of new species. The account of these sections awaits publication.

Great Oolite Series and Cornbrash

New knowledge of the Great Oolite series arises mainly from work beyond the southern limits of the county. Careful investigation of sections in the Upper Estuarine beds has shown that they show a rhythmic sequence (in some ways comparable to Coal Measures), with several individual units ending with a marine transgression in which limestone beds were deposited (Aslin, 1968). Multiple 'Estuarine Limestones' are therefore known, explaining the duplication sometimes found in Lincolnshire water borings. One particular bed seems to persist beneath much of the Fenland, but the correlation needs review.

The 1964 Spital pipeline sections mentioned previously show that the first marine bed above the Lincolnshire Limestones belongs to the basal Great Oolite Limestone, so that the Estuarine Limestones are not separately recognisable so far north. The beds concerned are very sandy, the harder parts varying from sandy limestone to calcareous sandstone. *Kallirhynchia* in these beds is closely allied to the characteristic rhynchonellid *K. sharpi* of the basal Great Oolite Limestone in Northamptonshire; the section thus suggests the northward loss of the marine element in the upper Estuarine Beds and increasing sandiness of the Great Oolite — both transitional to Yorkshire conditions.

No fundamental change to knowledge of the Cornbrash has arisen in recent years, but the record by Dennison in these Transactions (1955) of ammonite-

bearing Lower Cornbrash in trenches at Aunsby has added to knowledge of the discontinuous development of this subdivision in Lincolnshire, where we probably have its northerly limit.

Upper Jurassic

For the Kellaways, Oxford Clay and Corallian (Ampthill Clay) Lincolnshire is still largely *terra incognita* (largely because of the heavy drift cover). The recording of temporary sections to trace the development of these beds is of considerable importance for regional geology. Thus the main source of one of the most abundant fossils in the Boulder Clay of the Midlands — the ammonite *Amoeboceras serratum*, which must occur in quantities in the Lincolnshire Ampthill Clay — is still not known, and this in particular should come to light in the near future. Beyond this, any data bearing on zonal distribution, or on the change from the Midlands Kellaways Beds to the thick sands across the Humber would be of great interest.

The Kimmeridge Clay is becoming better known; here again surface sections have provided critical data, including identification at Elsham of a thick sandstone bed (formerly thought to be Cretaceous) as of basal Kimmeridge data (Kent and Casey, 1963). The implications of this discovery for Kimmeridge palaeogeography still have to be explained.

Lower Cretaceous

The refinement of the Lower Cretaceous sequence in the south of the Wolds by Swinnerton (1941) has been followed up by P. G. Thurrell, who has traced in more detail the overlap of the Sutterby Marl and Roach by the coarse Upper Carstone, and with E. F. Owen has described the rhynchonellid faunas from the Fulletby Beds (1968).

Beyond, to the north, the Upper Carstone transgresses on to the early part of the Necomian succession, a fact which was already known (Swinnerton and Kent, 1949, p. 73), but a trench section at Elsham in 1967 produced the surprising information that although the later Lower Cretaceous continues to cut down lower into Jurassic horizons northwards, the coarse ferruginous Carstone comes to be underlain by an Aptian/Albian clay, which is the transgressive member — a facies of the Cretaceous like the Speeton Clay, and similar to extensive transgressive Lower Cretaceous clays which rest on all horizons down to the Trias beneath the North Sea (Kent and Dilley, 1968).

Upper Cretaceous

The Chalk of Lincolnshire is a uniform, little varying, well-known formation. I propose to refer to a single new discovery — to the origin of the very widespread Plenus Marl which interrupts carbonate sedimentation at the top of the Lower Chalk.

It had been found in the course of North Sea exploration that the Plenus Marl is there, as on land, one of the most persistent and distinctive horizons, some 77 — 90 feet above the base of the White Chalk. At depth it is developed as pale green waxy looking clay with dark shale. The waxy appearance led to X-ray investigation of the clay minerals, and the bed was found to contain a large proportion of montmorillonite, which supports the suggestion that it may well be a volcanic ash layer.

Soon afterwards this identification was confirmed for the land area, when Hallam and Sellwood (1968) announced that analysis of outcrop specimens of the Black Band of South Ferriby in Lincolnshire and of samples of the Plenus Marl in Bedfordshire are almost pure montmorillonite. Their deduction is that

this marker band (and certain lower beds in the Mesozoic elsewhere in England) represents an ash fall from a short lived eruptive period, and is likely to be a particularly exact synchronous horizon. Another author (Jeans, 1968) differs with this interpretation, but his view that the clay is detrital is difficult to reconcile with its emplacement in an almost pure calcium carbonate sequence.

We see in the geology of Lincolnshire, the story of the accumulating marine rocks and their contained fossils, in continuity with the present. Lincolnshire has been part of the North Sea basin from Mesozoic times onwards; the processes of deposition and erosion are no different in kind from those of the Humber and Wash and the deeper offshore waters. From the present we can make deductions about the past; from the records of the past geological events we learn how and why our area achieved its modern form and constitution.

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SPORES OF AQUATIC HYPHOMYCETES IN THE CRINGLE BROOK, STOKE ROCHFORD

B. J. Glover and B. I. Lindsey, M.Sc., M.I.Biol.

Introduction

The aquatic Hyphomycetes as a group were first investigated by Ingold (1942). About sixty species have been described belonging to some thirty genera (Ingold, 1942, 1966), and many more, already recognised as spores, are awaiting description until they are isolated.

The aquatic Hyphomycetes belong to the Fungi Imperfecti, a group which contains all those fungi which do not normally produce sexual (perfect) stages. The Hyphomycetes are a sub-division of this group, consisting of parasites and saprophytes with spores produced on conidiophores which have a wide distribution over the hyphae. They may be simple, branched, separate or united in loose clusters. The branched, septate mycelium of aquatic Hyphomycetes lives in submerged decaying leaf tissue and the conidiophores project into the water and then liberate their spores. They have also been reported from other substrates. Scourfield (1940) found them in the leaf carpet of woods, Waid (1954) isolated them from roots of beech, and Jones and Oliver (1964) and Archer and Willoughby (1969) found them on submerged wood. The peculiarity of these fungi is that their whole life cycle including vegetative growth, spore production and liberation takes place below water. It is probable that these fungi occur in all well-aerated streams and, possibly, rivers flowing through wooded regions, and grow on the leaves of all sorts of deciduous broad-leaved trees and shrubs, *e.g.*, Oak, Horse-chestnut, Alder and Beech. These fungi are found on leaves in all states of decay, from those that have recently fallen to those nearly skeletonised. Their richest development occurs from October to December, this time coinciding with the autumnal fall of deciduous leaves. They undoubtedly play an important part in the decay of leaves. Thornton (1963) studying the nutrition and physiology of some aquatic hyphomycetes suggests that they are dominant in this aquatic environment because (*a*) they can utilise a wide range of simple and polymer carbohydrates, most of which occur in recently abscissed leaves, (*b*) they have a high degree of vitamin autotrophism, and (*c*) they have the ability to live and sporulate at the relatively low temperatures found in streams in winter. All these factors give them a definite advantage over environmental competitors such as Phycomycetes on some substrates.

Probably the outstanding feature of the aquatic Hyphomycetes is that the spores are not usually spherical or elliptical like most terrestrial fungus spores, but are tetraradiate or long and curved. In many species the spore consists of four (occasionally more) arms radiating from a central point, or as branches of a main axis. A tetraradiate spore is shown in figure 1. Ingold's studies (using drop cultures) have shown that the spores may develop in a number of distinct ways, *e.g.*, as phialospores, arthrospores, porospores or blastospores. An account of spore development is given by Ingold (1953). This evidence suggests that species with tetraradiate spores are probably phylogenetically diverse and that convergent evolution as a result of the aquatic environment has resulted in the formation of a tetraradiate form in unrelated fungi. It would be expected that if the tetraradiate form is an adaptation to an aquatic environment it is likely to occur in other groups of aquatic fungi, and it is relevent to note that the basidiospores of the marine fungus *Digitatospora marina*, which produces its hymenium under water, are tetraradiate. Also, some marine Ascomycetes, *e.g.*, *Halosphaeria quadricornuta*, have spores with four long appendages giving them a tetraradiate form. There seems little

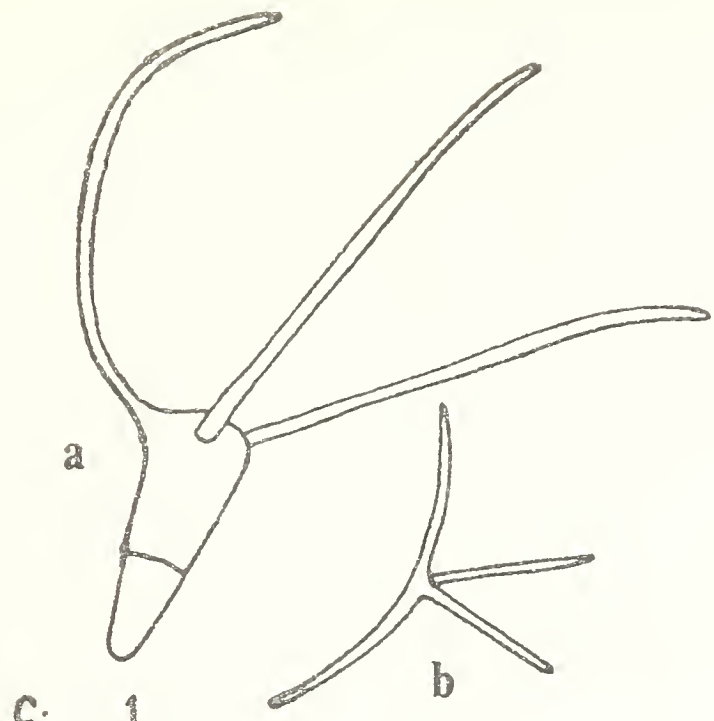

Fig 1

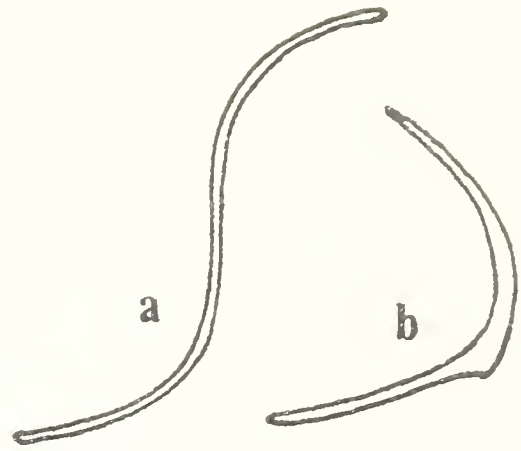

Fig 2

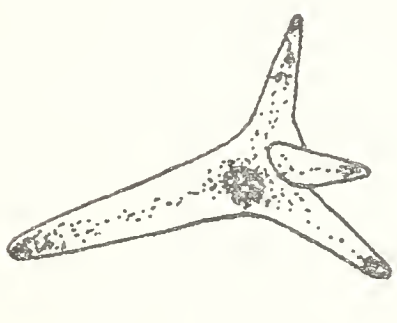

Fig 3

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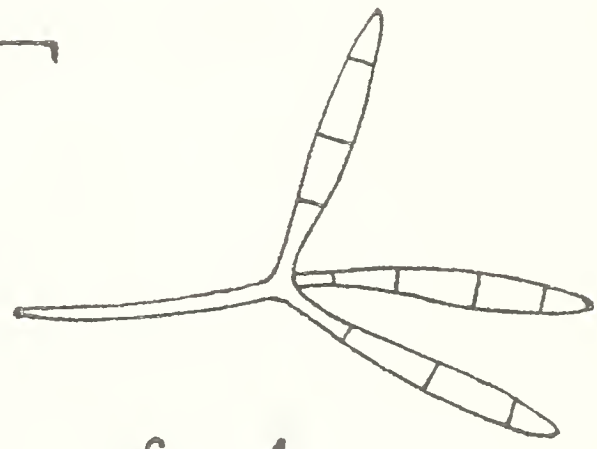

Fig 4

Fig. 1 *Tetraradiate spores*
(a) Clavariopsis aquatica (b) Alatospora acuminata

Fig. 2 *Curved/sigmoid spores*
(a) Flagellospora curvula (b) Lunulospora curvula

Fig. 3 *Shelled rhizopod*

Fig. 4 *Tridentaria sp.?*

doubt that this type of spore represents a special adaptation to aquatic environments, but it should be pointed out that it is not peculiar to them. There are a few terrestrial fungi with tetraradiate spores, *e.g.*, *Tetraploa aristata*. The other type of spore common among aquatic Hyphomycetes is long and filamentous. These are often termed sigmoid or curved spores (see figure 2). Examples are *Flagellospora curvula* which is a phialospore and *Anguillospora longissima* which is a terminal thallospore. Again, these different modes of development indicate different phylogenetic origins. Very probably the sigmoid/curved spore has much the same significance as the tetraradiate type, and it is interesting to note that it occurs in aquatic members of other groups, *e.g.*, the Discomycete *Apostemidium guernisaci* (Ingold, 1953). Many terrestrial fungi also have long, filamentous spores which casts some doubt on their significance in water. However, Ingold (1953) mentions that the pollen grains

of *Zostera* which are produced and pollinate under water, are filamentous and this tends to support the idea of some special significance.

The fact that tetraradiate spores have been found in a large number of unrelated fungi has led to much speculation concerning the nature of the significance of such structures. Webster (1959), using collodion-covered glass rods in water tunnels, calculated the efficiency with which tetraradiate, filamentous and ellipsoid spores were trapped. His results suggest that the tetraradiate spores were trapped much more efficiently, a probable reason for this being that when such spores make contact with a surface they do so at three points, the tips of the arms forming a tripod which is a very stable means of attachment. The efficiency of this process is increased by the fact that the tips of the arms expand when they come into contact with a solid substrate and form pads. Later, one or more of these arms form germ tubes.

The studies reported here were concentrated on a small stream, the Cringle Brook. This rises near Buckminster, Lincs. (SK 867232) and eventually joins the River Witham. Most of the water, however, emerges from a spring in Stoke Rochford Park (SK 918276). From this spring the water flows over a water fall into a shallow lake and then over a second fall into a narrow, fast running stream about 1 — 2 feet deep where abundant foam is produced. This section flows into a second shallow lake and then over a third water fall into another narrow, fast running section. Foam is also produced in this section. The water tends to be alkaline. It is interesting to note that foam produced by water falls never persists for more than a minute or two, but that produced by turbulence induced by the irregular bed of the stream sections often persists for days and collects in large clumps. The reason for this is unknown.

Methods

In order to investigate the occurrence of the spores of these fungi two techniques were used, namely foam sampling and spore trapping.

[*a*] *Foam sampling*

Foam samples were taken at monthly intervals from September, 1968 to December, 1969. It was thought that this investigation might indicate that some species are seasonal. Foam was present in particular parts of the Brook, especially after heavy rain. Foam acts as a natural spore trap, concentrating the spores which are present in the water. Collecting foam samples presents no real difficulties. The method used here was essentially that described by Ingold (1967). Foam was collected into a wide-mouthed bottle using a scoop. This was then shaken and left to stand for a few minutes. The foam settled rapidly into a liquid which could be poured into a McCartney bottle. A sample of a few millilitres was sufficient and to this was added an equal volume of acetic alcohol. The need for immediate preservation was to prevent the germination of the spores which proceeds quickly and hinders identification. The spores are rich in glycogen and, hence, stain with iodine solution. Lactophenol cotton blue and lactophenol trypan blue are also useful stains. A drop of the fluid obtained from the foam was placed on a slide and covered by a cover slip. The spores were clearly visible under low power (X 100) of the microscope although high power (X 400) was necessary in some cases to identify to species. Some idea of the relative numbers of different species present was obtained by identifying the first 100 spores encountered.

Another method of foam sampling is described by Nilsson (1964). He allowed spores to sediment from foam liquid in 10 ml. chambers and then counted them using a plankton microscope. He thus obtained some idea of absolute numbers.

[*b*] *Spore trapping*

It was thought that foam samples might not provide an accurate means of assessing the species in the Cringle Brook. Foam may be selective so an alternative method of sampling the spores was devised. Webster (1959) mentioned that cellophane coated rods could be used for trapping spores. Therefore, a spore trap was devised using a sheet of cellophane mounted in a flat perspex frame. A disc, 12 mm. in diameter, was exposed in the centre of each frame on which the spores impacted (Glover, 1969). These spore traps were mounted on stakes which were pushed into the bed of the Brook in the main stream. After 18 hours submersion the cellophane from the traps was carefully examined under the low power of a Projectina 4014/B microscope. The spores present in 40 microscope fields (selected at random using a standard micrometer stage) were recorded. It was hoped that some idea of absolute numbers would be obtained.

Several papers were used in the identification of spores. Ingold (1967) has written a general introductory paper with many illustrations. Petersen (1962, 1963a, 1963b) and Nilsson (1964) have written valuable taxonomic papers.

Results

Twenty-eight species of aquatic Hyphomycetes were encountered during the sampling. These are included in the species list at the end of this paper. It became obvious during sampling that certain species, *e.g.*, *Tetracladium marchalianum*, *Alatospora acuminata* and *Flagellospora curvula* were very common in the Cringle Brook, others were not so common and yet others were rare. The species in the list have been arranged, therefore, in four categories; very common, common, occasional and rare. This is, to some extent, a subjective estimate of frequency based on sixteen months' observations. Dominant spores are included in the 'very common' category and spores present in most samples but in low numbers are classed as 'occasional'. Some spores had a seasonal variation and ranged from, for example, rare to common during the year. As far as possible such spores have been 'averaged' for the list. It is interesting to note that Lindsey (1970) found that *Tetracladium marchalianum*, *T. setigerum*, *Flagellospora curvula*, *Tricladium angulatum* and *Alatospora acuminata* were all reasonably common in the River Stour in May, 1969. These results are essentially similar to those reported here. Nilsson's extensive ecological studies in Sweden (Nilsson, 1964) also disclosed a very similar dominant spora. Full results of the Cringle Brook studies will be reported elsewhere.

A tetraradiate structure reported by Ingold (1968) to be probably a shelled rhizopod was occasionally found in the samples. This had a prominent nucleus which is not characteristic of fungi (see figure 3). Several spores of an unidentified species were encountered (see figure 4). These had four or five arms and bore a distinct resemblance to spores figured by Ingold (1967, 1968) which he suggests might belong to the genus *Tridentaria*.

Conclusion

The Cringle Brook contains at least twenty-eight species of aquatic Hyphomycetes. The dominant members of the spora appear to be essentially those found by other workers in temperate areas.

It is hoped that this short report might encourage others to study these unusual fungus spores.

Some of this work formed part of a Special Study submitted as part of the requirements for a Certificate in Education of the University of Nottingham. The authors are indebted to the Trustees of the Stoke Rochford Estate for allowing access to the Cringle Brook.

Species List

Very Common

Alatospora acuminata Ingold.
Flagellospora curvula Ingold.
Tetracladium marchalianum De Wildeman.
Tricladium angulatum Ingold.

Common

Anguillospora longissima (Sacc. & Syd.) Ingold.
Clavatospora stellata (Ingold & Cox) Nilsson.
Heliscus aquaticus Ingold.
Lemonniera aquatica De Wildeman.
Tetracladium setigerum (Grove) Ingold.
Tricladium gracile Ingold.
Tricladium splendens Ingold.

Occasional

Anguillospora crassa Ingold.
Articulospora angulata Tubaki.
Clavariopsis aquatica De Wildeman.
Lunulospora curvula Ingold.
Piricularia submersa Ingold.
Tetrachaetum elegans Ingold.
Volucrispora graminea Ingold, McDougall & Dann.

Rare

Actinospora megalospora Ingold.
Articulospora inflata Ingold.
Centrospora acerina (Hartig) Newhall.
Clavatospora longibrachiata (Ingold) Nilsson.
Lemonniera terrestris Tubaki.
Tetracladium maxilliformis (Rostrup) Ingold.
Tricladium intermedium Petersen.
Tridentaria sp.?
Triscelophorus monosporus Ingold.
Volucrispora aurantiaca Haskins.

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GEOLOGY

A. Straw, b.a., ph.d.

This report comprises a brief review of certain of the Union's activities in geology over the past year, a record of a vertebrate fossil in glacial deposits near Louth, and additions to the list of published papers relating to the rocks and drifts of the county.

The President, Dr. P. E. Kent, led a field excursion on Saturday, July 26th, 1969, to examine rock exposures near Waddington and Ancaster. The party examined the Middle and Lower Lias section at the Waddington Brickworks, obtaining characteristic fossils from each of the subdivisions. It then moved to Leadenham where the fauna was collected from the lower beds of the Lincolnshire Limestone and continued to Ancaster for upward continuation of the section in the Lincolnshire Limestone at the Copper Hill Quarry and to the contact between the Lincolnshire Limestone and Great Oolite series at the old part of Gregory's Quarry.

At the Copper Hill Quarry (SK 977462) abundant micromorphic *Weldonithyris weldonensis* Muirwood, a species of *Terebratula* characterising the highest beds of the Upper Lincolnshire Limestone elsewhere, were obtained in depressions where the Ancaster Rag had been stripped from a hardened surface of the Ancaster Freestone only a few feet above the unconformable contact with the Lower Lincolnshire Limestone (Cementstones). At Gregory's Quarry interest was mainly concentrated on the fauna of the Great Oolite series, which included crushed specimens of the brachiopod *Kallirhynchia* at the Estuarine Limestone horizon.

In late September, 1969, an interesting discovery was made by Mr. C. Alabaster of Vale End, Welton-le-Wold, of a number of remains of elephant in the gravel quarry of Stephen Toulson & Sons Ltd., at Welton-le-Wold. The remains included an almost complete unrolled upper molar, and a 25 cm length of tusk. Various other pieces of bone were recovered, but were in such a friable state that their anatomical character could barely be distinguished, though a portion of rib was seen.

In March, 1970 further finds by Mr. Alabaster included parts of an antler and a small leg bone of a bovine animal. The fossils occured within the 'lower flint gravels' of the Welton deposits that were described in *Transactions*, Vol. 17 (2), 92 — 93, 1969, some 4 — 6 m below the base of the overlying till, at Ordnance Survey map reference TF 281884. Such finds are rare in Lincolnshire, and the uneroded character of the tooth and tusk might suggest that the animal lived (and died) at the time of gravel deposition. Alternatively, because the layers of flint gravel containing the remains appear to be cold climate solifluction materials, all the remains could have been derived from earlier deposits that exist nearby but are as yet unrecognised. It is expected that some revision of the stratigraphy and chronology of the glacial deposits around Welton-le-Wold and South Elkington will be necessary as one consequence of the finds. Professor F. W. Shotton of the Department of Geology, University of Birmingham, has kindly made a preliminary examination of the fossils, and confirmation of the genera and possibly species is awaited.

The papers listed below deal mainly with the superficial deposits and geomorphology of the county. The Secretary would be grateful to receive any corrections or additions to this cumulative bibliography.

SUPPLEMENT TO THE BIBLIOGRAPHY OF PAPERS RELATING TO LINCOLNSHIRE GEOLOGY AND GEOMORPHOLOGY

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BOTANY

Miss. E. J. Gibbons, F.L.S.

A late spring followed by a hot July meant a short season for finding flowers. Field meetings at Laughton and Alkborough were before the spring plants were out. Burwell and Twyford Forest were very enjoyable but no new records were made. Toothwort (*Lathraea squamaria*) were found at Burwell growing on Hazel. Those who were able to go to the Ancaster/Wilsford quarries found a profusion of limestone flowers. Crowle Waste or Moor was most interesting, but the number of plants was rather disappointing. The ground has been dug over for peat so continuously that the rare plants have vanished. Much Willow, Birch and Cottongrass cover the ground. Crossleaved Heath and Ling were frequent. The Greater Yellow Rattle was seen; also Twayblade and Purple Smallreed.

It was too late to find much at Great West Wood, Goltho at the Fungus Foray. Swallow Vale was on surprisingly acid ground due to the Red Chalk which has a very limited flora.

Divisional Records

Cirsium dissectum	6	Z. Porter, E. J. Gibbons, I. Weston
Crepis vesicaria	1	E. J. Gibbons
Erophila verna	1	E. J. Gibbons
Galinsoga ciliata	14	F. Lammiman
Lotus tenuis	5	E. J. Gibbons
Senecio viscosus	1 and 14	E. J. Gibbons
Symphytum orientale	8	F. Lammiman

The Survey of Woodlands by the Nature Conservancy has led me to look up woods in Domesday Book. This is most interesting and shows not only where ancient woods remain, but also where they have completely disappeared. New areas were planted for fox hunting and shooting 150 — 200 years ago and on land unprofitable for agriculture since 1930. These have no woodland flowers, unfortunately, but ferns and brambles cover the ground.

Large ancient woods have gone from the Isle-of-Axholme, from Saxilby with Ingleby northwards to Stow, South Hykeham, South Carlton with Riseholme, Reepham, Branston, Metheringham, Timberland, Ruskington and South Kyme. Further south Gelston near Caythorpe had 200 acres, Welby 230, Pointon 100 and Corby 1,130 acres. Round Wragby and Horncastle there were even more woods than those which remain; Baumber had 140 acres, Edlington 240 and Thimbleby 270 acres. Further east, Wood Enderby had 458 acres and Mareham-le-Fen 300 acres. Another district where woods have gone is near Louth where there were 260 acres at Stewton and 130 acres at Cockerington.

In Doomesday Book, woods were described as "woodland" for pannage which meant acorns for pigs to feed on, or as "underwood" meaning scrub. Strict laws were made of times and seasons when these were available and punishments were heavy for those who disobeyed.

MYCOLOGY

H. J. Houghton

After a very wet 1968, this year also started very wet, and the spring came very late. The summer was dry, and during the usual 'Fungus season' in September and October we had a very dry time. These events have been reflected in the numbers of fungi in evidence. Although a large number of species were found at both the South Humberside and the Union forays, undoubtedly the list would have been longer in a wetter time.

The first meeting of the year was on Laughton Common in May, and what fungi were found were represented mainly by lignicolous and coprophilous species and myxomycetes. Nine divisional record resulted in an already well-worked area.

The two meetings at Burwell Wood (South Humberside Group) and Twyford Forest in June both came during a very dry spell, and very few identifications were made. Only one divisional record, the rust *Triphragmium ulmariae* on *Filipendula ulmaria*, resulted. At the South Humberside Group meeting at Benniworth Haven in July we were again in a dry spell, and four divisional records resulted from very few finds. A particularly fine group of the polypore *Laetiporus sulphureus* was found on willow trees.

Dr. M. M. Lubin and the writer led the South Humberside Group foray in Swallow Vale Wood on the 5th October. Despite the continued dry weather, the wood produced 91 species, which included one county and 32 divisional records. The first specimen met with was the tiny *Pilobolus cristallinus* covering fresh cow pats. Other items of interest were some fine *Lepiota rhacodes*, to the delight of some mycophagists present, and a stand of the Dog Stinkhorn, *Mutinus caninus*, in the leaf litter. The dry rot fungus (*Serpula lacrymans*), and the conifer killer *Heterobasidion annosum* (Fomes), together with the Honey fungus (*Armillaria mellea*), were all present in quantity, and the attention of the Estate Office concerned has been drawn to them.

The annual foray of the Union was held in Great West Wood, near Wragby, by permission of the Forestry Commission. The dry weather still held, but in spite of this, 105 species were identified. These included 9 county and 37 divisional records. Miss G. M. Waterhouse led the meeting, and thanks are

due to her and her colleagues at Kew for the identification of most of the county and divisional records listed below. She expressed the opinion that it was odd that so many species (many of them rare) in the Pholiota — Flammula — Conocybe complex should be found in this wood. A few of the species found were first described by P. D. Orton in 1960. The large bag was very mixed, but not one myxomycete was found. Much interest was shown by members present in the tiny *Asterophora lycoperdoides* found growing parasitically on *Russula nigricans*, and in a log practically covered with *Phlebia merismoides*.

Specimens have been sent in this year by Miss N. Read (a very large fruiting body of the dry rot fungus from Horncastle), by Mr. S. A. Cox (*Peziza repanda* from straw bales), and Mr. P. Wood sent some interesting specimens of the rust *Coleosporium senecionis* on pine needles (actually from just outside the County boundary). Dr. M. M. Lubin sent in numerous specimens, and some of note were the County record *Volvariella bombycina*, two very large specimens of the myxomycete *Reticularia lycoperdon* and one of the rather rare *Lepiota friesii*, all found during the Nature Trail at Normanby Park.

As in the last three years, the writer led a foray in the Twigmoor Woods for the Scunthorpe Museum Society, which produced 55 species — all previously recorded in a well-worked area.

The list of records this year is very large for several reasons. None were given last year since the county records were temporarily not available, and the lists below include last year's recordings. Again, a considerable amount of collecting has been done by both Dr. M. M. Lubin and myself at both Union meetings and at private outings, often in previously little-worked areas — hence the large number of common species enumerated as records. As an example of collecting in little-worked areas, at a meeting of the Union at North Somercotes Warren in 1968, 13 species only were found, but all of them were new records for Division 9. There are still several divisions which are practically un-recorded, notably Divisions 9, (round Mablethorpe), 12 (Boston/Wainfleet), 14 (round Sleaford), 16 (round Bourne), 17 (round Swineshead) and 18 (the extreme south-east of the County). Other divisions are not by any means fully recorded, and ANY specimens sent in would be worth recording, and might prove to be records at least for the division concerned.

FUNGUS FORAY, STOKE ROCHFORD [DIV. 15]

19th October, 1968

County Records

Exidia thuretiana (Lév.) Fr.
Tyromyces caesius (Schrad. ex Fr.) Murr.
Arthroderma curreyi Berk.
Dasyobolus immersus (Pers. ex Fr.) Sacc.
Thaxteria phaeostroma (Dur. & Mont.) C. Booth

New Records for Division 15

Clitocybe clavipes
Pluteus umbrosus
Rhodotus palmatus
Lycoperdon giganteum
Coriolus hirsutus
Heterobasidion annosum
Inonotus hispidus
Tremella mesenterica
Ascobolus furfuraceus
Hypocrea rufa
Peziza cerea
Trichothecium roseum
Arcyria carnea
Crepidotus variabilis
Psathyrella candolleana
Geaster triplex
Coniophora puteana
Hapalopilus nidulans
Inonotus dryadeus
Serpula lacrymans

Calycella citrina
Hypoxylon fragiforme
Scutellinia scutellata

Fuligo septica

FUNGUS FORAY, GREAT WEST WOOD, WRAGBY [DIV. 7]

11th October, 1969

County Records

Conocybe blattaria (Fr.) Kühn.
Conocybe mairei Kühn.
Conocybe percincta P. D. Orton.
Laccaria proxima (Boud.) Pat.
Pholiota apicrea (Fr.) Moser apud Gams.
Pholiota tuberculosa (Schaeff. ex Fr.) Kumm.
Tyromyces albellus (Peck.) Boud. and Sing.
Lopadostoma turgidum (Pers. ex Fr.) Trav.
Oideum aureum Fr.

New Records for Division 7

Asterophora lycoperdoides
Clitocybe dealbata
Clitopilus prunulus
Coprinus lagopus
Gymnopilus sapineus
Hebeloma sacchariolens
Lacrymaria velutina
Lactarius piperatus
Marasmius wynnei
Panaeolus sphinctrinus
Pholiota lenta
Pluteus nanus
Russula delica
Inonotus hispidus
Pseudotrametes gibbosa
Tyromyces caesius
Xylodon versiporus
Calycella citrina
Hypoxylon fragiforme
Bolbitius vitellinus
Clitocybe langei
Coprinus hemerobius
Gomphidius rutilus
Hebeloma mesophaeum
Laccaria amethystea
Lacrymaria helvus
Marasmius epiphyllus
Micromphale foetidum
Pholiota flammans
Pluteus lutescens
Psathyrella gracilis
Tricholoma saponaceum
Phlebia radiata
Stereum rugosum
Tyromyces stipticus
Chlorociboria aeruginascens
Lasiosphaera ovina

OTHER RECORDS, 1968 AND 1969

County Records

Farysia olivacea (DC) Syd. on Carex riparia	Div. 11
Panellus serotinus (Schrad. ex Fr.) Kühn	Div. 13
Marasmius alliaceus (Jacq. ex Fr.) Fr.	Div. 4
Tomentella livida Litsch. (ex Belton LNU 1955)	Div. 15
Volvariella bombycina (Schaeff. ex Fr.) Sing.	Div. 2
Amauruchaete tubulina (Alb. & Schr.) Macbr.	Div. 4

Divisional Records

EX SOUTH HUMBERSIDE GROUP FORAY, ROXTON WOOD [DIV. 4]

13th October, 1968

Amanita fulva
Collybia peronata
Coprinus lagopus
Galerina mutabilis
Inocybe maculata
Lentinellus cochleatus
Marasmius ramealis
Mycena fibula
Nolanea sericea
Pluteus salicinus
Calocera cornea
Typhula erythropus
Puccinia poarum Niels. on Tussilago farfara
Hypoxylon multiforme
Arcyria carnea
Leocarpus fragilis
Reticularia lycoperdon
Boletus badius
Conocybe tenera
Cortinarius violaceus
Gymnopilus junonius
Lactarius glyciosmus
Lepiota cristata
Mycena lactea
Mycena leptocephala
Paxillus panuoides
Russula emetica
Hydnum repandum
Tyromyces lacteus
Arcyria nutans
Physarum viride
Trichia floriformis

EX-SOUTH HUMBERSIDE GROUP FORAY, SWALLOW VALE WOOD [DIV. 4]

5th October, 1969

Agrocybe erebia
Collybia maculata
Coprinus radiatus
Cystoderma granulosum
Hygrophoropsis aurantiaca
Lepiota friesii
Tricholomopsis rutilans
Mutinus caninus
Serpula lacrymans
Tyromyces stipticus
Trichoscyphella hahniana
Pilobolus crystallinus on cow dung.
Clitocybe infundibuliformis
Coprinus plicatilis
Cystoderma amianthinum
Gomphidius rutilus
Inocybe lacera
Paxillus atrotomentosus
Lycoperdon ericetorum
Phallus impudicus
Stereum sanguinolentum
Coprobia granulata

FROM OTHER SOURCES

Div. 1

Lactarius rufus
Trichia floriformis

Div. 2

Asterophora lycoperdoides
Hebeloma sacchariolens
Tricholoma sulphureum
Merulius tremellosus
Peziza repanda
Tubifera ferruginosa
Gymnopilus junonius
Russula betularum
Lycoperdon caelatum
Puccinia poarum
Helotium scutula

Div. 5

Boletus edulis
Clitocybe cerussata
Cortinarius anomalus
Galerina mutabilis
Hygrophorus puniceus
Inocybe flocculosa
Marasmius androsaceus
Mycena pura
Panaeolus subbalteatus
Russula mairei
Russula vesca
Clavulina rugosa
Pseudotrametes gibbosa
Coprobia granulata
Scutellinia scutellata
Otidea umbrina
Trichia botrytis
Boletus badius
Clitocybe dealbata
Galerina hypnorum
Gymnopilus penetrans
Hypholoma sublateritium
Marasmius ramealis
Melanoleuca melaleuca
Panaeolina foenisecii
Russula foetens
Russula nitida
Lycoperdon ericetorum
Phlebia merismoides
Tremella mesenterica
Hypoxylon multiforme
Scutellinia trechispora
Geoglossum cookeanum
Metatrichia vesparium

Div. 6

Agrocybe praecox
Coprinus plicatilis
Galerina mutabilis
Bjerkandera fumosa
Polyporus brumalis
Xylodon versiporus
Dasyscyphus virgineus
Helotium calyculus
Peziza repanda
Badhamia macrocarpa
Badhamia foliicola
Cribraria argillacea
Physarum cinereum
Trichia botrytis
Bolbitius vitellinus
Clitopilus prunulus
Panaeolus subbalteatus
Exidia albida
Stereum rugosum
Puccinia poarum
Dasyscyphus niveus
Lasiosphaera ovina
Arcyria cinerea
Badhamia utricularis
Comatricha nigra
Perichaena depressa
Physarum nutans
Trichia scabra

Div. 7

Coprinus niveus
Puccinia poarum
Xylosphaera polymorpha
Laetiporus sulphureus
Peziza repanda
Perichaena depressa

Div. 8

Triphragmium ulmariae on *Filipendula ulmariae*

Div. 9

Boletus luteus
Clitocybe dealbata
Hygrophorus puniceus
Volvariella speciosa
Auricularia auricula
Claviceps purpurea (ergots)
Peziza ammophila
Bolbitius vitellinus
Hygrophorus conicus
Lactarius vellereus
Lycoperdon ericetorum
Puccinia poarum
Nectria cinnabarina

Div. 10

Serpula lacrymans

Div. 11

Coprinus dissemminatus
Chlorociboria aeruginascens
Coprinus plicatilis

Div. 13

Boletus luteus
Hebeloma longicaudum
Hygrophorus puniceus
Inocybe lacera
Lactarius helvus
Clavulina rugosa
Coriolus versicolor
Fistulina hepatica
Stereum hirsutum
Galerina mutabilis
Hebeloma sacchariolens
Inocybe maculata
Lactarius blennius
Volvariella speciosa
Clavulinopsis pulchra
Exidia glandulosa
Phellinus ferruginosus
Tyromyces caesius

Div. 14

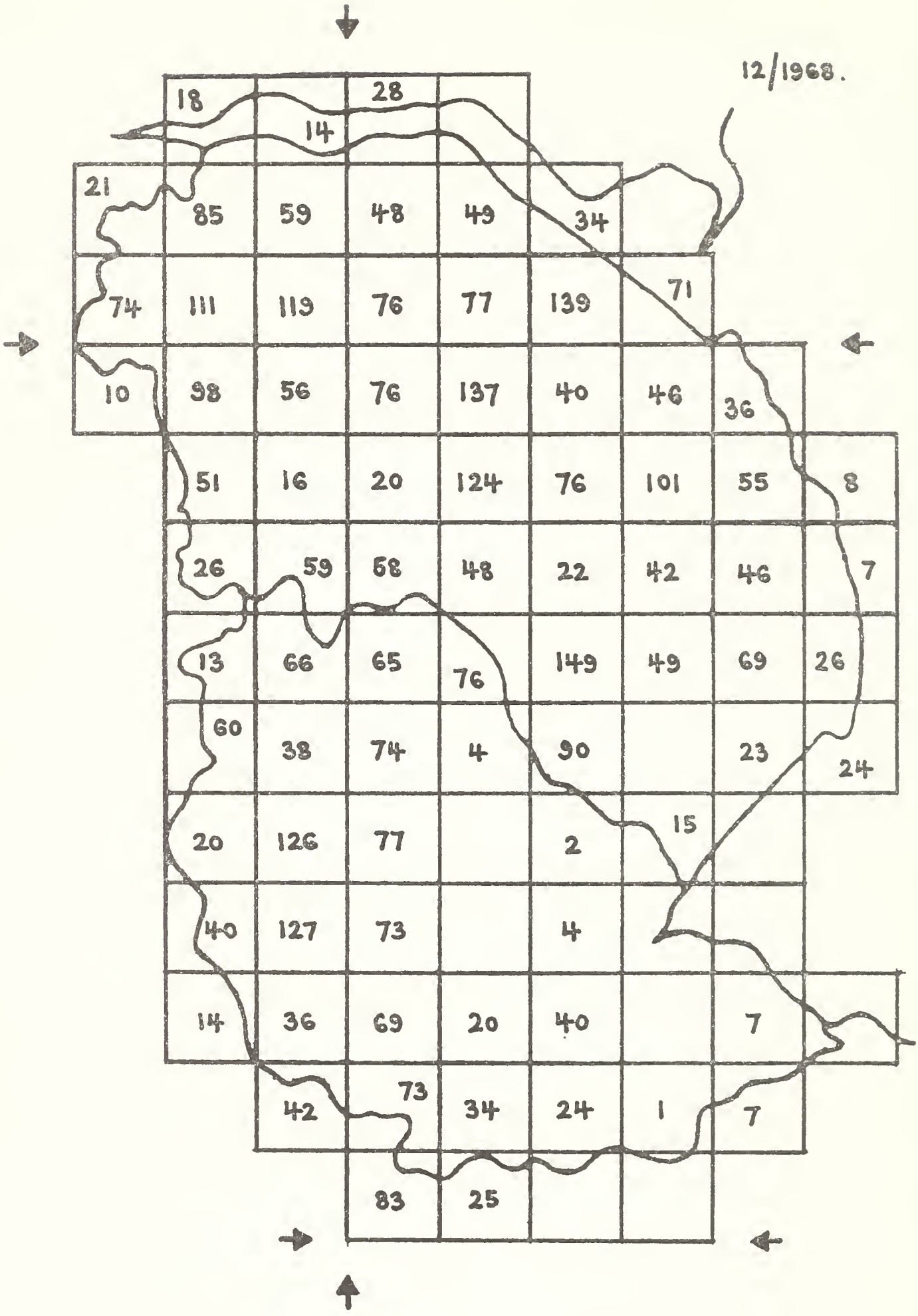
Agrocybe praecox
Entoloma sinuatum
Exidia albida
Dasyscyphus nivevs
Scutellinia scutellata
Arcyria nutans
Coprinus dissemminatus
Psathyrella candolleana
Tyromyces lacteus
Mollisia cinerea
Trichoscyphella hahniana
Trichia varia

BRYOLOGY AND LICHENOLOGY

M. R. D. Seaward, m.sc.

Bryophyte Check-List

As a result of the publication of *A Bryophyte Check-List for Lincolnshire* (1969, Lincolnshire Natural History Brochure No. 4, Lincoln), moss and hepatic records for the past year will not be enumerated in these *Transactions*. The writer would however like to record his thanks to the members of the Union who have during the past eleven years furnished him with the material and field records so necessary for research of this nature. Many of the records for the less-accessible regions of the county (*e.g.*, divisions 17 and 18) would not have been possible without the co-operation of our members. This work is, however, far from complete and although one would not envisage dramatic changes in vice-county (and indeed divisional) distributional status, a programme of 10 km. grid square mapping is under way. A summary of the species/varieties frequency in each of the 89 grid squares (Lincolnshire records only indicated where unit overlaps into a neighbouring county) is given in cartographical form overleaf.



Lichenology for 1969

The writer's lichenological activities in the county have been somewhat limited during the past year, but he is grateful to those who have made collections — especially to Miss N. Wallace. Her county records for *Parmelia acetabulum* (Gibraltar Point) and *Ramalina obtusata* (Calceby) are particularly noteworthy; the former has an interesting British distribution with many recent

records from the S.E. of England, and a very scattered distribution in the Midlands, Devon, Wales and Scotland (old and recent records); the latter species is only the third record for the genus *Ramalina* in Lincolnshire during the past 50 years — its occurrence in Lincolnshire prior to 1915 was much more widespread.

Lichen Check-List

The following are further divisional records to the Lincolnshire check-list (see: *Lincs. Nat. Union Trans.*, **16,** 153 — 159, 233 — 234; **17,** 33, 104); vice-county records are indicated by an asterisk:

Caloplaca decipiens (Arnold) Jatta 2, 11.
C. heppiana (Müll. Arg.) Zahlbr. 11.
C. holocarpa (Hoffm.) Wade 6, 11, 13.
Candelariella aurella (Hoffm.) Zahlbr. 11.
C. medians (Nyl.) A. L. Sm. 11.
Cladonia ochrochlora Flörke 13*, 15.
C. pyxidata (L.) Hoffm. 11.
Lecanora atra (Huds.) Ach. 11.
L. expallens Ach. 11.
Lecidea scalaris (Ach.) Ach. 10.
Parmelia acetabulum (Neck.) Duby 11*
P. subaurifera Nyl. 11.
P. subrudecta Nyl. 11.
Peltigera polydactyla (Neck.) Hoffm. 11.
Placynthium nigrum (Huds.) Gray 13.
Ramalina obtusata (Arnold) Bitt. 11.*
Rinodina subexigua (Nyl.) Oliv. 6, 11.
Verrucaria nigrescens Pers. 11.
V. sphinctrina Ach. 6.*
Xanthoria candelaria (L.) Th. Fr. 2, 6.

VERTEBRATE ZOOLOGY

M. Johnson, F.Z.S.

MAMMALIA

Records on the distribution of small mammals in the county continue to accumulate thanks to the steady stream of owl pellet samples sent to me by keen helpers. I have dealt with Barn Owl pellets from twenty-nine different sites and in addition have received samples from woodland areas of both Tawny and Long-eared Owl pellets. A further twenty-two *Harvest Mouse* skulls have been obtained from barn owl pellets and as several new localities have produced results, a new distribution map of the *Harvest Mouse* distribution has been made. Two harvest mice were found dead in a pond near Fiskerton on the 31st October and have been preserved.

As a change from the tiny skulls of *Mice* and *Voles* I was pleased to examine the skull of a *Common Porpoise* which was found on the beach at Mablethorpe and sent in to me by Mr. Marshal Haley.

As yet no real evidence of the presence of *Dormice* in the county has come to light and I would be very pleased to hear from anyone who can produce any information that might help to confirm that they can still be found in woodlands. Dormice in the South of England have started to use bird nesting boxes for their living quarters, and I have erected a number of boxes in areas where past records of Dormice have been obtained and await results.

Once more Frank Curtis has sent in some excellent bat reports from the Sudbrooke Park area. During August he discovered a mixed colony of *Pipistrelle* and *Long-eared Bats* in a house-loft. In October he found a colony of *Noctule Bats* which had taken residence in a hollow beech tree and together we spent some time netting specimens which were photographed and released to confirm the identification. On the evening of May 8th three *Noctule Bats* were observed flying over the Doddington Road gravel pits. *Pipistrelle Bat* records include a colony found at Saltfleetby by Mr. J. W. Blackwood and a specimen found dead at Grimsby reported by Mrs. I. Weston. Records of *Whiskered Bat*, and *Long-eared Bat*, caught while mist-netting birds for ringing, have been given to me by Mr. J. A. East.

A valuable collection of mammal records obtained in the Spalding area during 1953-58 have been sent in by Mr. John Redshaw. I would be very grateful for any similar information for any area in the county.

REPTILIA AND AMPHIBIA

On April 25th I visited the Doddington Road gravel pits and observed large numbers of breeding toads and on May 2nd *Smooth* and *Crested Newts* were present in fair numbers in a pond near Fiskerton Village.

Many records of common lizards seen in the Doddington Road area have been received and members of the Lincoln Museum nature club have brought in adults and young from this locality for me to examine. I am making an attempt to obtain evidence to support a statement that the *Sand Lizard* is still to be found on the Lincolnshire coast and would welcome any information from members interested in reptiles.

ARACHNOLOGY

G. W. Whatmough, m.p.s.

A new spider of the Genus *MINYRIOLOIDES* at Gibraltar Point

In May, 1966 a male Erigonine spider was found under driftwood below marram dunes at Gibraltar Point. It clearly belonged to the Genus *Minyrioloides* and was thought at the time to be sufficiently close to the only described British member of the genus to be labelled as such, *viz.: M. trifrons* (O.P.C.). The solitary specimen was then set aside. In June 1967 a further male was found and about a month later a mature female *Minyrioloides* was taken, the epigyne of which was quite distinct from published drawings of *M. trifrons*. This spider, together with one of the males discovered earlier, was eventually sent to Dr. A. F. Millidge for his opinion. Dr. Millidge, a specialist on Linyphiine and Erigonine spiders considered that the specimens were definitely not *trifrons*. It was his intention to visit Gibraltar Point at a suitable time in 1969 when both sexes would be mature and plentiful. Before this could be arranged however, several adult females had been identified by J. Crocker and J. R. Parker, among material taken during an ecological survey of sand dunes at Winterton National Nature Reserve Norfolk.,

Crocker and Parker have now described the new spider and have named it *Minyrioloides maritimus*. A good series of specimens was available from the Winterton dunes and male and female holotypes have been selected, together with a series of paratypes, these are deposited in the arachnological collection of the British Museum (Nat. Hist.).

Re-examination of past Lincolnshire records and specimens has revealed that *M. maritimus* was found at Gibraltar Point as long ago as May 1959, this specimen had also been diagnosed as *trifrons*. There is an earlier record (June 1910) for *M. trifrons* for Cleethorpes, made by W. Falconer. This spider could have been either *trifrons* or *maritimus*. The former is normally found in inland marshy areas, but has been recorded on maritime dunes at Tentsmuir National Nature Reserve in Fifeshire; the latter species has, to date, only been taken on the coast.

Minyrioloides maritimus has since been found in five other dune areas in Norfolk, and John Crocker has taken specimens himself at Gibraltar Point. Most of our local specimens have occurred under beach litter and driftwood, but the typical habitat of the new species is in marram clumps. To date Gibraltar Point is the northern limit of its range, but it would seem likely that it will be found in similar marram dune areas up to the Humber. The spider is about 2·5 mm in length, the carapace dark brown, the abdomen dark grey. It should be looked for in and under marram clumps during the second half of May or the first half of June, though females could be found until autumn. Females are identified by the epigyne pattern seen when the spider is viewed ventrally under the microscope. Males are perhaps less readily distinguished by two characteristics of the palpal organ, the shape of a basal process on the palpal tibia and the appearance of a long, coiled 'tegular apophysis'.

References

LOCKETT, G. H. and MILLIDGE, A. F. (1953). "British Spiders", Vol. 2 (*Ray Soc.*), pp. 231 — 232.

CROCKER, J. and PARKER, J. R. (1970). *Brit. Arach. Soc. Bulletin*, Vol. 1, No. 6, p. 81.

ENTOMOLOGY

A. E. Smith, B.SC.

Lepidoptera

For a good many species of lepidoptera, 1969 was the best season since 1947. The excellent summer weather allowed for the build up of large numbers of some of the commoner multibrooded species, and some of the immigrants were much in evidence also. Thus the common vanessids (Small Tortoiseshell, Peacock and Red Admiral) occured in abundance particularly in the autumn, and the migratory moth, the Silver Y, was most plentiful throughout the season. The three common whites built up to near epidemic proportions, particularly in the brassica growing areas of the county.

Whether the dry, sunny summer conditions of 1969 will lead to a recovery of numbers of a wider spectrum of species, and particularly the more local species, remains to be seen. My own experience is that this need not necessarily be so. Not all species of course would be favoured by such a season.

Although up to 20 — 25 species were recorded at individual field meetings these were mainly common insects. There were no records of any degree of importance made on these occasions.

Butterflies

The main points of interest are that the isolated colonies of Chalk Hill Blue and Grayling appear to be maintaining themselves satisfactorily. The Brimstone is widespread in the west half of the county northwards to the Lincoln area. Odd records were received for Dingy and Grizzled Skipper, but numbers and localities seem to be diminishing.

While, superficially, 1969 may have seemed to have been an excellent year for lepidoptera, it is the overall trends which are of significance, and the status of many species in the county must give rise to concern. Since 1945 there have been 43 species of butterflies recorded in Lincolnshire which is approximately three-quarters the total British list of truly native butterflies (as opposed to migrants).

In order to assess the status of these 43 species today I have placed them in three arbitrary categories:

(*a*)	Common (and usually ubiquitous) species	17
(*b*)	Local species	12
(*c*)	Extremely rare or probably extinct	14

No records have been received for species in category (*c*) for at least five or six years. The point I wish to make is that approximately one third of the butterflies present in the county as recently as post-1945 are now probably extinct or else exceedingly vulnerable. The reason for this sad state of affairs is undoubtedly a complex of interrelated factors and to discuss them is beyond the scope of this short report. Significantly however, nearly all the 14 species in category (*c*) are very specific in habitat requirement.

Moths

For a variety of reasons it is more difficult to accurately assess the long term trends in species of moths, but it is probably true to say that the same comments apply as those made for butterflies. One would doubt, however, if the trends are generally so extreme as they appear to be for Lincolnshire butterflies.

So far as 1969 is concerned, one county record was made — the *Pretty Chalk Carpet* (Boston). In the region of 100 new divisional records were made, but this reflects the small number and uneven distribution of lepidopterists in the county rather than scarce species being discovered. The bulk of these divisional records were for very common species which had not by sheer chance been recorded in a particular division previously.

A short list selected from some of the more interesting species recorded is given below:

26 *Dingy Footman* — Laughton.
30 *Four Dotted Footman* — Linwood.
44 *Clouded Buff* — Scotton.
69 *Light Knot Grass* — Scotton.
90 *The Twin Spotted* — Gibraltar Point
106 *Uncertain* — Boston.
117 *Lyme Grass Moth* — Gibraltar Point.
146 *Small Clouded Brindle* — Boston.
153 *Butterbur Moth* — Gibraltar Point.
174 *Coast Dart* — Gibraltar Point.
184 *Sand Dart* — Gibraltar Point.
187 *Portland Moth* — Scunthorpe.
237 *Dark Chestnut* — Boston.
239 *Lunar Underwing* — Gibraltar Point.
253 *Red Line Quaker* — Boston.
266 *The Starwort* — Saltfleetby.
285 *Feathered Rinunculus* — Gibraltar Point.
300 *Shore Wainscott* — Gibraltar Point.
318 *Hedge Rustic* — Laughton.
327 *Marbled Coronet* — Scunthorpe.
340a *White Colon* — Gibraltar Point.
386 *Silver Hook* — Gibraltar Point.
387 *Gold Spangle* — South Thoresby.
415 *White Satin* — Spalding and Scunthorpe.
444 *Rosy Wave* — Gibraltar Point.
537 *Blue Boardered Carpet* — Boston.
588 *Pretty Chalk Carpet* — Boston.
589 *The Gem* — Gibraltar Point.
655 *Waved Umber* — Boston.
693 *Barred Umber* — Newball.
739 *Chocolate Tip* — Woodhall.
831 *Scalloped Hook Tip* — Messingham.

ADDITIONS TO THE LIST OF LINCOLNSHIRE PSOCOPTERA

New's statement (*Lincs. Nat. Union Trans.*, **16,** 216) that "there do not appear to be any previous records (of Psocoptera) for the county" is unfortunate, since by reference to the volume in which the above article appears, other records, although meagre, are to be found (*Lincs. Nat. Union Trans.*, **16,** 99 — 100). First records for *Cerobasis guestfalicus* Kolbe and *Mesopsocus immunis* (Steph.) are indicated — the latter being an addition to New's list.

The author also has in his possession a microscope slide collection of Walter J. Wood (1862-1939), a Fellow of the Royal Microscopical Society and one of the founder members of the once-flourishing Grimsby and District Antiquarian and Naturalists' Society (1896-1952). One of the slides is of *Lachesilla pedicularia* (L.) — collected from Grimsby in 1895.

More recently, specimens of *Lepinotus patruelis* Pearman have been forwarded to me by Mr. G. N. Holland. These were collected from mangel seeds in store at Sleaford (December, 1967) and provide us with a further addition to the Lincolnshire list.

I should like to express my thanks to Dr. E. Broadhead for the identification of the above material.

M. R. D. Seaward, m.sc.

NON-MARINE MOLLUSCS IN LINCOLNSHIRE

E. J. Redshaw

Lincolnshire has been noted for its variety of non-marine molluscs. Since about 1880 over 110 of the 178 recognised British species have been recorded from South Lincolnshire (V.C. 53) alone. However, since the late 1940's or early 1950's recording has been much neglected, and following the death of the late J. F. Musham, the last active secretary of the Union's Conchological Section, interest apparently faded away, and the section became extinct in 1956.

In 1951 a "Census of the Distribution of Non-Marine Mollusca", based on vice-county boundaries, was published in the journal of The Conchological Society. In 1974, to celebrate the centenary of the "Journal of Conchology", the Society intends to publish a distribution atlas based on the 10 Km squares of the National Grid, after the manner of the B.S.B.I. "Atlas of the British Flora". Records to be included in the mollusc atlas will indicate recording over three periods of time, as follows: (*a*) before 1835, (*b*) 1835-1950 and (*c*) 1950 onwards. Due to the lack of recording since 1950 the present status of non-marine molluscs in Lincolnshire is largely unknown.

In order to assess coverage The Conchological Society's recorder for the "Atlas" maintains a map to show the number of species recorded per 10 Km square. Coverage is divided into five categories, as follows: 1. no records, 2. 5 — 20 species, 3. 20 — 40 species, 4. 40 — 60 species and 5. over 60 species. The following percentages indicate the coverage of Lincolnshire squares at 1st January, 1970, since 1950.

category 1.	No records since 1950	38%
2.	5 — 20 species	26%
3.	20 — 40 species	30%
4.	40 — 60 species	6%
5.	Over 60 species	nil

The majority of recording since 1950 has been in the coastal and marshland area between Skegness/Wainfleet and Mablethorpe/Alford, in the Lincoln/Hykeham area, along the upper Witham valley including and above Grantham, in the upper valley of the River Glen, and in the Bourne/Spalding/Crowland area. The squares falling within category (4) are all in the south of the county, and include the Bourne/Morton/Spalding/Swineshead squares and the Welland Washes. The most neglected areas are in East Elloe, east and north-east Kesteven and north-east and north-west Lindsey including the area west of the River Trent.

In order to improve our knowledge of the present status and distribution of non-marine molluscs in Lincolnshire the writer would be pleased to correspond with members interested in the subject. Lists of species recorded, together with grid reference, locality, type of habitat, and rough assessment of status (abundant, present, thought to be scarce) and year recorded (or date if recent); or specimens for identification which should be wrapped in sterile wool and packed in stout cardboard boxes; would be welcomed by the writer who may be contacted at the following address: *Rowanhill, 7 Fennell Road, Pinchbeck, Spalding, Lincs.*

REPORT OF THE HON. GENERAL SECRETARY, 1969-70

The year has been a particularly successful one for publications, both *Lincolnshire Soils* and the *Bryophyte Check List for Lincolnshire* being well received and sold a total of 450 copies to date. With the aid of a guarantee from the Lincolnshire Trust for Nature Conservation Ltd., the separate publication was made possible of Mr. A. E. Smith's Presidential Address *Nature Conservation in Lincolnshire.* This sold very widely, over 1,100 copies having been sold in the first ten months. There has also been a steady sale for *The Birds of Lincolnshire* (1953) and occasional sets of back numbers of *Transactions.*

The untimely death during the year of Mr. J. R. Morgan was keenly felt, not only for his competent organisation of field meetings, but also for the sound common sense which he brought to bear on administrative matters. His main interest was centered round butterflies, but as an enthusiastic although modest amateur he had a considerable fund of knowledge about natural history which he was very ready to share with others.

Seven Field Meetings were attended by 255 members and two successful Junior weekends were held at Gibraltar Point. The main winter programme had mixed success and included Mr. G. de Boer on "The Evolution and History of Spurn" at Grimsby and a Symposium on Forestry at the Horncastle Residential Centre. A full and successful programme of indoor and field meetings was organised by the South Humberside Group.

The Executive Committee met five times during the year, when the functions of Officers were defined and recorded, the Nature Conservancy's Assistant Regional Officer for Lincolnshire was co-opted to obtain closer liaison and the Union made representations with the Lincolnshire Trust for Nature Conservation to the Central Electricity Generating Board on plans to dump pulverised fly ash on Crowle Waste. The Hon. General Secretary attended a meeting of the Natural History Societies Committee of the Council for Nature as a representative of the East Midlands. The questionnaire to members produced a response of 11%.

STATEMENT OF ACCOUNT

from January 1st to December 31st, 1969

Receipts

	1969 £	s	d	1968 £	s	d
To Cash at Midland Bank, Lincoln, 1st January, 1969	147	16	4	(292	0	1)
„ Subscriptions	377	5	0	(357	15	0)
„ Donations to Publications Fund	40	1	0	–	–	–
„ Sale pf Publications	150	9	0	(41	13	7)
„ Offprints:						
Presidential Address (A. D. Townsend)	7	5	0	–	–	–
Pleistocene Events (Straw)	11	10	0	(15	17	6)
„ Part Payment Winter Lectures	–	–	–	(9	8	3)
„ Subscriptions % 'Animals' Mag.	–	–	–	(	16	9)
„ Sale: Mr. A. E. Smith's Presidential Address	77	9	0	–	–	–
„ Loan from Lincolnshire Trust for Nature Conservation Ltd. for Publication A. E. Smith's Presidential Address	200	0	0	–	–	–
„ Interest on Defence Bonds	–	–	–	(12	10	0)
	£1011	15	4	£730	1	2

Midland Bank Deposit Account, 31st December, 1969, £687 10s. 6d. (£649 2s. 6d.).

Expenses

	1969 £	s	d	1968 £	s	d
By Printing 430 *Transactions*, Vol. XVII, No. 1, Pt. 2	89	10	0	(84	10	0)
„ Printing 400 *Transactions*, Vol. XVII, No. 2, Pt. 1	151	15	0	(173	12	0)
„ Printing *Transactions*, Vol. XVI, No. 4, Pt. 1	–	–	–	(105	0	0)
„ Printing 1000 *Lincolnshire Soils*	50	10	0	–	–	–
„ Printing 250 *Bryohpyte Check List*	53	0	0	–	–	–
„ Offprints (Pleistocene Events)	11	10	0	(26	12	6)
„ Block for Transactions cover	–	–	–	(9	8	6)
„ Subscriptions to Societies	11	6	0	(10	16	0)
„ Stationery and Printing	21	15	3	(6	11	0)
„ Secretarial Expenses (Mrs. Adams. Messrs. Morgan, Posnett, Robinson, Townsend)	34	2	9	(22	7	8)
„ Hire of Rooms	23	5	11	(21	13	6)
„ Lecturers' Expenses		15	0	(16	11	0)
„ Duplicating and Posting of Notices	113	19	7	(78	7	8)
„ South Humberside Group	10	0	0	(15	0	0)
„ Purchase Copies 'Outdoor Studies Code'	2	0	0	–	–	–
„ Forestry Commission Charge	2	0	0	–	–	–
„ Income Tax on Defence Bonds, 1968	10	12	6	(10	0	0)
„ Bank Charges and Cheque Book	2	0	0	(1	15	0)
„ Printing 3900 Mr. A. E. Smith's Presidential Address	246	5	0	–	–	–
„ Expenses in Distribution of above	5	0	0	–	–	–
„ Cash at Bank, 31st December, 1969	172	8	4	(147	16	4)
	£1011	15	4	£730	1	2

Audited and found correct, 18th February, 1970.

ROBERT WITHERS, *Hon. Auditor.*

CONTENTS

		Page
PRESIDENTIAL ADDRESS: LINCOLNSHIRE GEOLOGY IN ITS REGIONAL SETTING	*Dr. P. E. Kent, D.Sc., Ph.D., F.R.S., F.G.S.*	135
SPORES OF AQUATIC HYPHOMYCETES IN THE CRINGLE BROOK, STOKE ROCHFORD	*B. J. Glover and B. I. Lindsey, M.Sc., M.I.Biol.*	140
SECTION REPORTS:		
Geology	*A. Straw, B.A., Ph.D.*	145
Botany	*Miss E. J. Gibbons, F.L.S.*	146
Mycology	*H. J. Houghton*	147
Bryology and Lichenology	*M. R. D. Seaward, M.Sc.*	151
Vertebrate Zoology	*M. Johnson, F.Z.S.*	153
Arachnology	*G. W. Whatmough, M.P.S.*	154
Entomology	*A. E. Smith, B.Sc.*	155
Additions to the List of Lincolnshire Psocoptera	*M. R. D. Seaward, M.Sc.*	156
Non-Marine Molluscs in Lincolnshire	*E. J. Redshaw*	157
REPORT OF THE HON. GENERAL SECRETARY, 1969-70		158
STATEMENT OF ACCOUNT		159

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